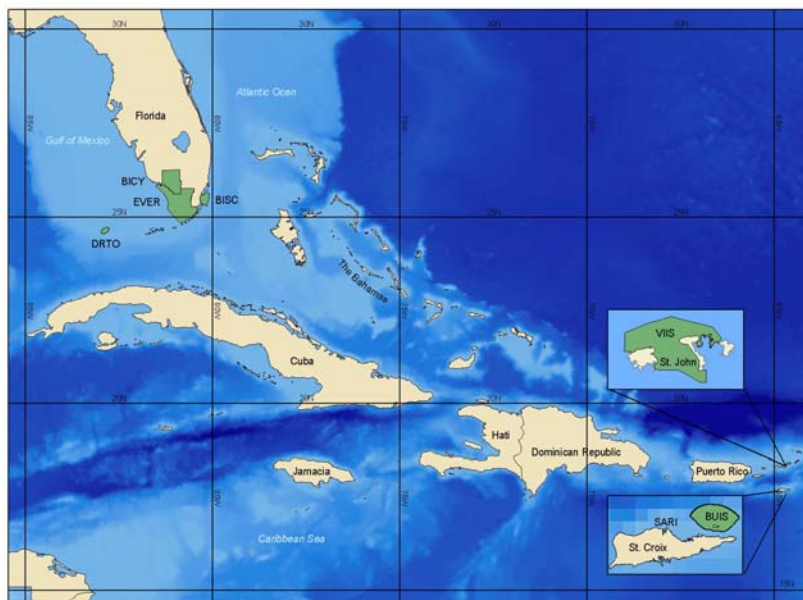


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## South Florida / Caribbean Network Inventory & Monitoring Program



Matt Patterson

South Florida / Caribbean Inventory & Monitoring Network  
Coordinator

May 9, 2006

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## Vital Signs Monitoring Networks

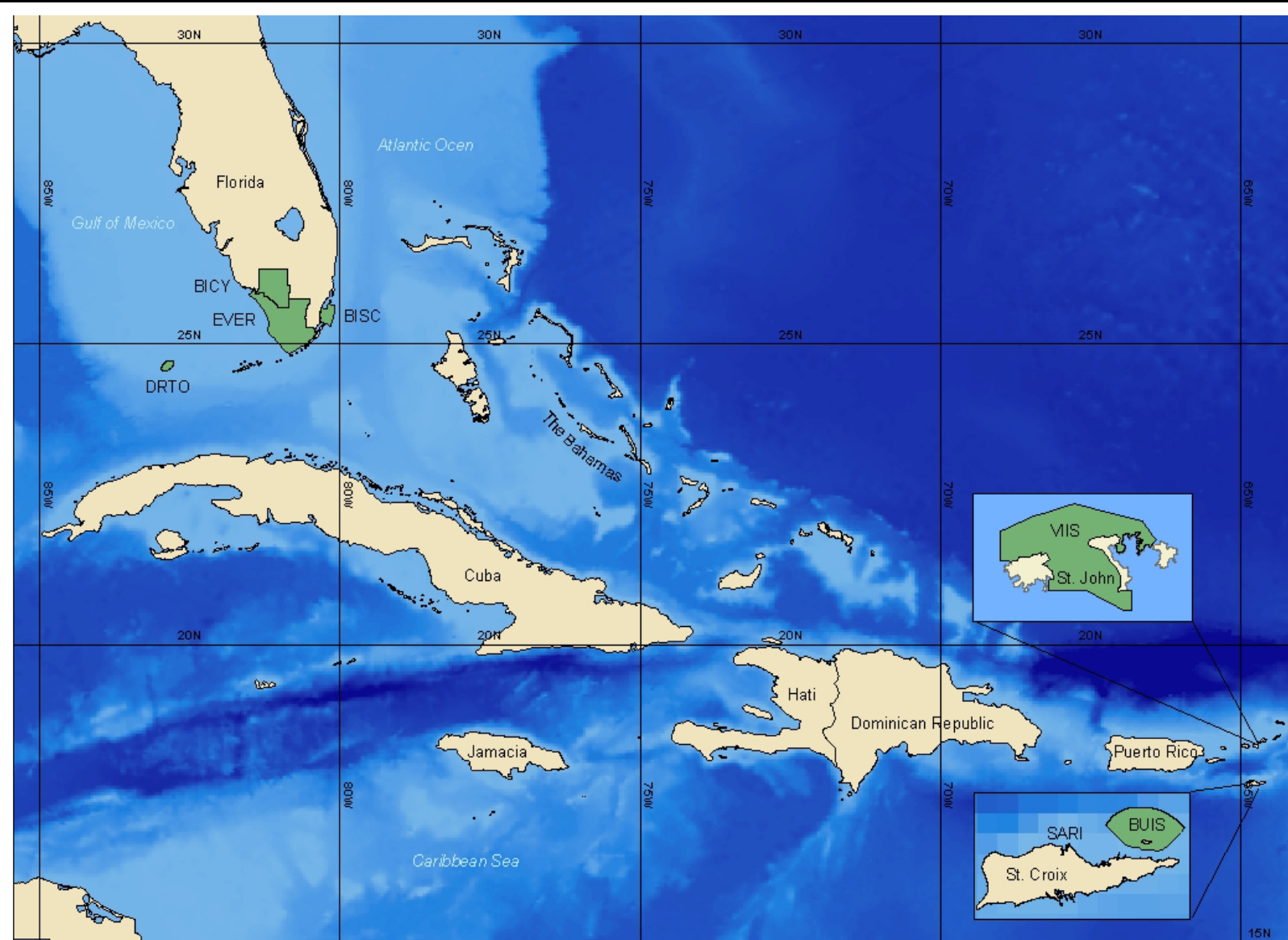
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## Vital Signs monitoring goals:

- Determine the status and trends in selected indicators of the condition of park ecosystems to allow managers to make better-informed decisions and to work more effectively with other agencies and individuals for the benefit of park resources.
- Provide early warning of abnormal conditions of selected resources to help develop effective mitigation measures and reduce costs of management.
- Provide data to better understand the dynamic nature and condition of park ecosystems and to provide reference points for comparisons with other, altered environments.
- Provide data to meet certain legal and congressional mandates related to natural resource protection and visitor enjoyment.
- Provide a means of measuring progress towards performance goals



## Steps in designing a monitoring program

- 1) Define purpose and scope**
- 2) Compile existing data and relevant information**
- 3) Develop conceptual models**
- 4) Select indicators and specific monitoring objectives for each**
- 5) Determine sampling design and sampling protocols.**

## How did we identify these indicators!?

### The Indicator Development Process





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## The Indicator Workshops:

- **Florida Bays and Marine Areas**
- **South Florida Upland and Wetland Areas**
- **U.S. Virgin Island Ecosystems**



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## Florida Bay and Marine Areas

- Hosted at the SFCN home office
- Attended by **25 regional marine experts** (Appendix A, p.10) that reviewed and accepted the applicable conceptual models
- Identified 27 overarching ecological process of concern within the marine resources of the SFCN
- Generated a list of **32 potential indicators**





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## South Florida Upland and Wetland Areas

- Hosted at the SFCN home office
- Attended by **22 regional freshwater and terrestrial experts** that reviewed and accepted the applicable conceptual models
- Outlined 13 overarching ecological processes of concern within the terrestrial/freshwater resources of the SFCN.
- Added **23 potential indicators** to our list of 32 from the first indicator workshop



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## U.S. Virgin Island Ecosystems

- Vital Sign indicator workshop in Christiansted, St. Croix, USVI.
- Reviewed and modified the indicators developed at the first two workshops
- Ensured applicability for both South Florida and U.S. Virgin Island environments
- 70 participants at the three workshops combined
- A total of 69 indicators were developed using this process



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## Single Indicator Worksheet (Page 2)

**Monitoring Question(s):** *Monitoring question(s) that will be addressed*

**Which conceptual model(s) is this indicator linked to?**

- ☐ 2.3 Freshwater Wet Prairies and Marshes Ecological Zone
- ☐ 2.4 Forest Uplands and Wetlands Ecological Zone
- ☐ 2.5 Island Interior Ecological Zone
- ☐ 2.6 Mangroves, Beaches & Tidal wetlands Ecological Zone
- ☐ 2.7 Florida Bay Ecological Zone
- ☐ 2.8 Biscayne Bay Ecological Zone
- ☐ 2.9 Coastal Shelf / Deep Oceanic Ecological Zone

**Which parks are associated with this indicator?**

South Florida Parks

- ☐ Big Cypress National Preserve (BICY)
- ☐ Biscayne National Park (BISC)
- ☐ Dry Tortugas National Park (DRTO)
- ☐ Everglades National Park (EVER)

U.S. Virgin Islands Parks

- ☐ Buck Island Reef Natl. Monument (BUIS)
- ☐ Salt River Nat. Hist. Park & Ecol. Res. (SARI)
- ☐ Virgin Islands National Park (VIIS)

**Metric:** *Refers to the elements to be measured and the data to be collected*

**Method:** *Short description of a methodology or references a developed protocol*

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**Frequency:** *Stipulates how often the indicator should be measured*

- ☐ Continuous
- ☐ Monthly
- ☐ Annual
- ☐ Every \_\_\_\_\_ Years
- ☐ Other (Please specify):

**Timing:** *Specifies the time of year that data collection should occur*

**Scale of Collection:** *Scale at which data should be collected*

- |   |  |
|---|--|
| <input type="checkbox"/> Regional (incl. areas outside parks) | <input type="checkbox"/> Multiple Parks      |
| <input type="checkbox"/> Park-wide _____                      | <input type="checkbox"/> Site Specific _____ |
| <input type="checkbox"/> Other (Please specify):              |  |

**Scale of Process or Element Operation:** *Scale at which the process or element operates*

- |   |  |
|---|--|
| <input type="checkbox"/> Regional (incl. areas outside parks) | <input type="checkbox"/> Multiple Parks      |
| <input type="checkbox"/> Park-wide _____                      | <input type="checkbox"/> Site Specific _____ |
| <input type="checkbox"/> Other (Please specify):              |  |

**Scale of Analysis:** *Scale at which analysis can be inferred*

- |   |  |
|---|--|
| <input type="checkbox"/> Regional (incl. areas outside parks) | <input type="checkbox"/> Multiple Parks      |
| <input type="checkbox"/> Park-wide _____                      | <input type="checkbox"/> Site Specific _____ |
| <input type="checkbox"/> Other (Please specify):              |  |

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**Basic Assumptions:** *Specifies the underlying assumption(s) that, if not true, would invalidate this indicator/methodology*

**Research Needs:** *Identifies any known research need(s) that would facilitate understanding of how this indicator fits within the ecosystem model*

**Management Goal:** *Desired future condition*

**Threshold Target:** *Stipulates the resource condition (numerically if possible) and the amount of variation from this condition that will be tolerated (accepted as natural variation). If insufficient knowledge exists, say “insufficient knowledge”.*

**Response:** *Specifies what management action is recommended if the threshold or target is not met*

**Constraints:** *Lists issues/concerns about the indicator related to its successful implementation*

**Status:** *Identifies whether monitoring is proposed, in development, or on-going*

**Estimated cost:** *Rough estimate of cost, either in total or per sample, per replicate, etc.*

**References:** *Contacts, experts or literature relevant to the indicator (continue on back if necessary)*

All of this information was entered into a database and placed on the ranking website



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[Back to Ranking Page](#)

## Sediment elevation in mangroves and mud banks (Fl Bay) Salt Ponds (USVI) and Mangroves fringes

zandy hillis-starr zandy\_hillis-starr@nps.gov wildlife ecology/biology Caribbean

Ranking Comments:

Methodology Comments:

Sediment elevation in mangroves and mud banks (Fl Bay)  
Salt Ponds (USVI) and Mangroves fringes

Ecological: ☐ Very High ☐ High ☐ Medium ☐  
Low ☐ Very Low ☐ No Opinion

Feasibility: ☐ Very High ☐ High ☐ Medium ☐  
Low ☐ Very Low ☐ No Opinion

Management: very high

Legal: medium

Rank



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Parks where monitoring would be conducted

☒ [BICY](#) ☒ [BISC](#) ☒ [BUIS](#) ☒ [EVER](#) ☒ [SARI](#) ☒ [VIIS](#)

<b>Indicator:</b>	Sediment elevation in mangroves and mud banks (Fl Bay) Salt Ponds (USVI) and Mangroves fringes
<b>Monitoring Question(s):</b>	How does sediment dynamics (accretion, subsidence and erosion) in mangroves, mud-banks, salt ponds respond to: 1) hydrology (Quality, quantity, timing and duration), 2) Sea-level, 3) Storms / hurricanes, and 4) upland erosion.
<b>Justification:</b>	Sediment dynamics (the build up or loss of) is a basic process that can have far reaching impacts on the ecosystem. It is especially important in mangroves, mud-banks, and salt ponds. In South Florida, hydrology, sea-level rise and storms have been found to affect mangrove and mud bank sediment elevation. Everglades restoration of regional hydrology is expected to impact this issue. In the U.S. Virgin Islands, sediment filling of ephemeral guts and salt ponds from upland development is an important issue.
<b>Metric:</b>	- Measure relative elevation, elevations change, accretion/erosion at "sentinel" sites.
<b>Method:</b>	- Use Surface Elevation Tables (SETs) and marker horizons. See Whelan et al (2005), Estuaries 28(6) and References there in (esp. Cahoon et al 2002). - Do in conjunction with vegetation monitoring and surface and ground water monitoring.
<b>Frequency:</b>	quarterly- mangroves at first, maybe able to drop back to biannual (Wet and Dry) - sample after storm events
<b>Timing:</b>	Need to be able to respond rapidly to an "event"- a hurricane, fire, and flood.
<b>Scale of Collection:</b>	Regional (incl. areas outside parks), Multiple Parks Multiple NPS units, FWS units, and state/local parks have SETS- Those are in multiple biogeographic regions.
<b>Scale of Operation:</b>	Regional (incl. areas outside parks, Multiple Parks, Park-wide, Site Specific, Processes affecting elevation occur over multiple scales
<b>Scale of Analysis:</b>	Multiple parks, Site Specific
<b>Basic Assumptions:</b>	Sediment Elevation Table (SET) pipe is a benchmark and does not move (Surveys of the SET pipes can be done to make sure this is the case) Other assumptions from the Scale of Process above



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Management Goal:	Trend support management goals for no human influences on trends (upwards or downwards depending on system) -
Threshold	Slope is zero or positive +/- 10-20%
Target:	Relate ground elevation to lowest seaward berm height (VIIS) Accumulation of sediment in Salt Ponds and guts tied to natural process (and rates) and not to anthropogenic run off.
Response:	Replant mangroves after disturbance If not "keeping pace"- add phosphorous Upland sediment reduction measures for erosion runoff into salt ponds
Constraints:	- Known to work very well in coastal (tidal) wetlands and mud-banks (F1 Bay) - Has not been used in US VI
Status:	Ongoing: - SETS are widely used. 3 networks are present in ENP. TJ Smith has sites along Shark and Lostmans. R. Halley has SETS on mud-banks in F1 bay (5 sites). F. Sklar (2) has SETS in the Taylor Sough/ C 111 area. - Smith is funded starting Feb 2006 by Coe/Recover
	Sediment dynamics are a Comprehensive Everglades Restoration Plan (CERP) Monitoring and Assessment Plan (MAP) indicator.
Estimated Cost:	For SETs, marker horizons, hydrology sampling (surface and ground water) and vegetation- ALL at the site ~25K/year
References:	For mangroves and F1. Bay mudbanks see Bob Halley USGS and MIT looking at sedimentation inputs into salt ponds (in 1970's).



## Ecological Significance (Page 5)

- Ecological Importance
- Good indicator of system resource or function
- Early warning/sensitive to change
- Supporting data/scientific work
- Connectivity

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## Feasibility

- Well-documented rigorous protocols
- Technically feasible
- Interpretable
- Low-cost
- Cost-sharing opportunities

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## Management Significance

- Relevant to key management decisions
- Early warning
- Allow better-informed management
- Clearly understood
- Public interest

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## Legal Mandate

- **Legal requirement:** The park is **required** to monitor this specific resource/ indicator by some specific, binding, legal mandate
- **Executive Order, Mandate, Park Enabling Legislation:** The resource/indicator is specifically covered by an Executive Order
- **Goal:** There is a GPRA goal specifically mentioned for the resource/indicator being monitored, or the need to monitor the resource is generally indicated by some type of federal or state law
- **Concern:** The resource/indicator is listed as a sensitive resource or resource of concern by credible state, regional, or local conservation agencies or organizations, but it is not specifically identified in any legally-binding federal or state legislation.





## Participant Response Rate

- Of the 130+ people invited to rank the proposed SFCN vital signs, 102 people participated.
- Thirty-three (33) of the 102 participants were NPS employees and 69 were non-NPS scorers.

\*It should be noted that not all people who participated in the prioritization process ranked all 69 indicators.

**(Page 7)**

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U. S. DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE



## South Florida / Caribbean Network **Vital Signs Monitoring Plan** Phase 1 Report



Big Cypress National Preserve  
Biscayne National Park  
Buck Island Reef National Monument  
Dry Tortugas National Park

Everglades National Park  
Salt River Bay National Historical Park and  
Ecological Preserve  
Virgin Islands National Park

## 3 Phase Planning Process

### Phase 1

- Background, Issues, and Conceptual Models

### Phase 2

- Vital Signs Indicator Selection

### Phase 3

- Monitoring Protocols, databases, staffing, budget, analysis, and reporting



## Vital Signs Report Outline

CHAPTER 1: Introduction and Background	
CHAPTER 2: Conceptual Ecological Models	
<b>CHAPTER 3: Vital Signs</b>	<b>Sept. 2006</b>
CHAPTER 4: Sampling Design	Dec. 2007
CHAPTER 5: Sampling Protocols	Dec. 2007
CHAPTER 6: Data Management	Dec. 2007
CHAPTER 7: Data Analysis and Reporting	Dec. 2007
CHAPTER 8: Administration/Implementation of the Monitoring Program	Dec. 2007
CHAPTER 9: Schedule	Dec. 2007
CHAPTER 10: Budget	Dec. 2007
CHAPTER 11: Literature Cited	



## Monitoring Plan Challenges

- Decide what ongoing monitoring can be adopted fully
- Identify areas where ongoing monitoring needs refinements
- Determine cost benefits for doing monitoring in-house vs. contract
- Determine sampling frequency of multiple vital signs incorporating annual sampling workload with rotating panel multi-year sampling
- Estimate per sample costs
- Identify what indicators can be colocated/cosampled
- Develop data management plan



## Vital Signs Next Steps

- Meet with key monitoring activities to better understand what data is currently being collected and where
- Decide on sampling design framework
- Develop staffing plan dependent on in-house expertise needs
- Develop monitoring protocols for in-house monitoring
- Begin testing protocols



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A photograph of a white egret standing in a field of tall green grass. The egret is facing left with its head turned slightly towards the camera. In the background, there are trees with green and yellowing leaves. A white speech bubble with a black outline is positioned to the left of the egret, containing the text "Any Questions?".

Any Questions?



